

Dr. Abbot's summary of his report follows:

The year has been marked by the practical completion for publication of Volume IV of the Annals, but no appropriation is yet available for its publication. Close agreement of solar variation was found for 1918 and 1919 between results of Mount Wilson, Calif., and Calama, Chile, 4,000 miles apart. A further remarkable confirmation of the solar variation comes from a comparison of Smithsonian observations in Chile with photoelectric observations of the brightness of Saturn by Dr. Guthnick, of the Berlin-Babelsberg Observatory. This comparison indicates that the nature of the rapid solar variation consists in the rotation with the sun of rays of unequal brightness which strike the different planets successively in the order of their longitudes and fall one after the other upon the earth as the sun by rotation brings them into line with us. A new nocturnal radiation instrument, provisionally called the "honeycomb pyranometer" on account of its cellular structure, and which employs the well-known hollow chamber principle of the "absolutely black" body, but without loss of sensitivity, has been successfully constructed and tried. By the generosity of Mr. John A. Roebling, of New Jersey, it has been possible to remove the Chile station to a mountain above the dust and smoke of its former plateau location, and also to erect a building on the Harqua Hala Mountain, in Arizona, to which the Mount Wilson solar-constant work will be removed in September, 1920.—H. H. K.

DEGREE OF TEMPERATURE TO WHICH SOILS CAN BE COOLED WITHOUT FREEZING.

By GEORGE BOUYOUCOS.

[Abstracted from *Journal of Agricultural Research*, Nov. 15, 1920, Vol. XX, No. 4, pp. 267-269.]

Careful tests showed that soil will not freeze at a temperature of -1° C. (30.2° F.) unless it is vigorously agitated. If not disturbed, it will remain at this temperature indefinitely without freezing.

Dr. Bouyoucos found further that, if not disturbed, sand, loam, and clay soils may be cooled to -4.2° C. (24.4° F.), and peat and muck to -5° C. (23° F.) without freezing. The moisture content of the soils had no influence on the possible extent of supercooling.

This explains why the soil need not be frozen even though the temperature of the air and of the soil itself may be considerably below 32° F.

The author points out that by the method now in vogue for measuring the temperature of soils during cold weather the thermometer may give a record several degrees below the freezing point and yet the soils may not be actually frozen.

"Indeed," he says, "the ability of soils to resist freezing even when their temperature is much below the freezing point throws considerable new light on questions regarding the temperature of soils in cold seasons and consequently upon the physical, chemical, and bacteriological processes going on in the soils during those seasons."—J. Warren Smith.

CLIMATE OF NEW ZEALAND.¹

By Lieut. Col. D. C. BATES, Dominion Meteorologist.

[Review.]

This useful book² gives averages of temperatures, rainfall, and, in some cases, sunshine, for 11 stations in New Zealand, ranging from Auckland in the north, with

a superb subtropical climate, to Invercargill in the south with the climate of southwest England. The climatic features of each district are succinctly described, but we miss the generalized account of the meteorology of the region which would bind the sections together and enable the reader to see how far the local characteristics are subservient to the prevailing winds and other far-reaching causes.

INFLUENCE OF TEMPERATURE AND HUMIDITY ON THE GROWTH OF PSEUDOMONAS CITRI AND ITS HOST PLANTS AND ON INFECTION AND DEVELOPMENT OF THE DISEASE.

By GEORGE L. PELTIER.

[Abstracted from *Journal of Agricultural Research*, Dec. 15, 1920, Vol. XX, No. 6, pp. 447-506.]

This is a complete and valuable study, not only of the effect of temperature and humidity on the development of citrus diseases, but on the growth and development of the different citrus trees.

Two types of rest periods are discussed: Winter dormancy, brought about by the approach of cold weather when cell activity ceases to a great extent, and the short rest periods which occur during the growing season when some of the cell functions merely slow up.

With the time factor included, the optimum temperature for citrus plants lies between 20° and 30° C. (68° and 86° F.).

Three conditions are essential for disease infection—the presence of free moisture on the plant, a suitable temperature, and an actively growing plant.

The conditions for the most rapid development of citrus diseases are also those that are most favorable for the growth of the host plants.

This study, with another that Dr. Peltier is now making on the relations of climate to citrus canker and scab, will make a valuable addition to our at present rather incomplete knowledge of the effect of climate and weather on plant diseases.—J. Warren Smith.

CITRUS FRUIT FUMIGATION SAFEST IN DARK AND AT MODERATE TEMPERATURES.

While it has long been known that the presence of light during fumigation of citrus fruit with hydrocyanic acid is one of the factors which causes injury to both fruit and foliage, it has not been known that light before and after fumigation has a similar effect. This fact has been disclosed by recent tests conducted in California by specialists of the United States Department of Agriculture, who have made a report of the experiments with suggestions for preventing injury, in department Bulletin 907, "Fumigation of Citrus Plants with Hydrocyanic Acid: Conditions Influencing Injury."

Moisture and temperature, as well as light, influence fumigation injury, and experiments show that fumigation is more safely performed at temperatures below 80° F. Sudden changes of temperature over a wide range during exposure tend greatly to increase plant injury. Trees in wet soil are likely to be more severely injured than healthy trees in dry soil.

¹ Reprinted from *The Meteorological Magazine*, London, December, 1920, p. 257.
² Prepared for publication in the *New Zealand Official Year-Book*.